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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/038,734	12/31/2001	Seungmoo Choi	CHOI 30-10-5-4-13	3732

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EXAMINER

BOOTH, RICHARD A

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 08/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

A-X

Office Action Summary

Application No.

10/038,734

Applicant(s)

CHOI ET AL.

Examiner

Richard A. Booth

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 June 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15-19 and 21-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15-19 and 21-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
 If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☐ All b) ☐ Some * c) ☐ None of:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
 * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
 a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 15, 17-18, 21-24 and 27-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Park et al., U.S. Patent 6,458,656.

Park et al. shows the invention as claimed including a MOS device comprising: a gate structure 24 on a semiconductor substrate 23, the gate structure having an upper layer of a hard mask material 34, the hard mask material 34 being contoured such that it varies in thickness across the gate structure, and wherein the thickness of the hard mask terminates at a periphery of the gate structure; and a halo implant 62 in the semiconductor substrate, the halo implant having a depth profile under the gate structure which inherently follows at least a portion of the contour of the hard mask layer (see figures 4-5 and col. 5-line 15 to col. 7-line 19).

With respect to claim 17, note that the hard mask layer has a convex upper surface.

Concerning the particular process used to form the halo implant region (see claim 18), note that the particular process employed will not lend patentable significance to the instant invention since the claims are directed to the product and not the process.

Regarding claims 21-24 and 26-28, note that the hard mask layer is dome shaped, the depth profile of the halo implant and channel region follows the side portions of the hard mask layer contour, the hard mask has a maximum thickness at a mid point and a minimum thickness at a periphery, and the depth of the halo implant at the mid point is zero (see figs. 4-5).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 16 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Park et al., U.S. Patent 6,458,656.

Park et al. shows the invention substantially as claimed but fails to expressly disclose the halo implant under the gate edge is substantially equal to a maximum thickness of the hard mask layer, and where the hard mask layer is silicon oxide.

With respect to the hard mask layer being silicon oxide, official notice was taken of this fact in the office action mailed 6-27-02. and since such official notice has gone unchallenged, this limitation is taken to be admitted prior art. Concerning the particular depth of the halo implant region, the implant depth would be optimized during routine experimentation depending upon, for instance, the desired overlap capacitance and would not lend patentability to the instant application absent the showing of unexpected results.

Claims 19 and 29-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Park et al., U.S. Patent 6,458,656 in view of Wang et al., U.S. Patent 5,776,811.

Park et al. is applied as above but fails to expressly disclose forming a memory device including polysilicon and tungsten silicide. Wang et al. discloses performing halo implants (see figs. 7-8) on a memory device including both polysilicon and tungsten silicide layers (see col. 5-lines 56-67). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the structure of Park et al. with a EPROM comprising polysilicon and tungsten silicide layers because this is a suitable alternative to the ONO memory structure of Park et al..

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Park et al., U.S. Patent 6,458,656 in view of Rengarajan, U.S. Patent 6,194,278.

Park et al. is applied as above but fails to expressly disclose spacers located on the side of the gate structure and contacting the hard mask within the periphery of the gate structure.

Rengarajan discloses a hard mask 120 and opposing spacers on a gate structure which contact the hard mask within the periphery of the gate structure (see fig. 7 and its description). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device of Park et al. so as to form spacers on the gate structure as disclosed by Rengarajan because this would allow for additional controllability over the location of the halo implant.

Response to Arguments

Applicant's arguments with respect to claims 15-19 and 21-30 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A. Booth whose telephone number is 308-3446. The examiner can normally be reached on Monday-Thursday from 7:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on 308-3325. The fax phone numbers for the organization where this application or proceeding is assigned are 308-7724 for regular communications and 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 308-1782.



Richard A. Booth
Primary Examiner
Art Unit 2812

August 1, 2003